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Invertebrate Conservation News



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INVERTEBRATE CONSERVATION NEWS



No. 64, February 2011

EDITORIAL

Historical records show that few of today's extreme weather events are unprecedented. Thus, even the recent very severe flooding in Australia and several other countries around the world cannot necessarily be attributed to climate change. On the other hand, climate change could underlie the apparently increasing frequency of extreme events.

Climate change has been mentioned quite recently in *ICN* and is probably therefore best not discussed again in the present edition, except in passing. The recent very cold weather in the UK and in some other parts of Europe is, however, of topical interest. The previous two winters (2008-09 and 2009-10) brought substantial snowfall to parts of the UK where little more than an occasional light covering had been seen for many years. The yet more severe conditions in December 2010 were sufficient to prompt suggestions that a pattern of cold winters, as occurred in the 1960s, has begun.

As far as invertebrates are concerned, climate change has been cited as a reason for the spread of certain warmth-loving species into higher latitudes. Examples in the UK include the Long-winged conehead *Conocephalus discolor* (see *ICN* 21 and 34) and the Wasp spider *Argiope bruennichi* (see *ICN* 31). Perhaps the recent run of cold winters might cause some retrenchment of expanded distributions.

Species that thrive in a temperate continental climate are probably not harmed by cold winters but they might suffer when cold and mild spells alternate – as often happens in the relatively oceanic climate of the UK. Such conditions could disturb hibernation or favour the development of fungal diseases. On the other hand, species that thrive where winters are usually mild, such as in the Mediterranean region,



are perhaps more likely to die out near the edges of their ranges when unusually cold weather occurs, especially in successive years.

In a landscape where species could disperse unimpeded by artificial barriers, their changing distributions could be regarded more with interest than concern. Unfortunately, however, those barriers, including vast areas of intensive agriculture as well as major roads and other linear features, are exacerbating the deleterious effects of weather and of climate change, while also limiting their potentially beneficial effects.



NEWS, VIEWS AND GENERAL INFORMATION

More on neonicotinoid insecticides

As mentioned in *ICN* 60, Buglife – The Invertebrate Trust has, with other organisations, been campaigning for a ban on the outdoor use of neonicotinoid pesticides in the UK. The high potency, persistence and systemic properties of these neurotoxic substances enable them to be used in relatively small quantities as seed dressings. In principle, this might be regarded as environmentally preferable to widespread spraying. Even their use as a root drench might in principle seem environmentally less damaging than the spraying of large trees in countries where such spraying is permitted. Unfortunately, however, their highly systemic properties and persistence can cause them to enter the food chain in ways that could be almost uniquely harmful to non-target invertebrates.

Taking account of the known harmful properties of neonicotinoids, Buglife argued that a ban on their outdoor use would be justified according to European Union Directive No. 91/414, which states that “*Member States shall ensure that a plant protection product is not authorized unless... it has no unacceptable influence on the environment.*” Nevertheless, national governments are generally unlikely to ban the use of currently approved pesticides unless confronted with new and compelling evidence that they are more hazardous in the field than alternative products.

There was a recent flurry of activity after *The Independent* newspaper (McCarthy, 2010) reported previously undisclosed findings from research conducted at the US Department of Agriculture's Bee



Research Laboratory. Amid claims of leaked confidential information, the project leader Dr Jeffrey Pettis explained that a paper had been in the pipeline for publication for almost two years, having been delayed by the peer review process.

The research had been stimulated by concern over the very serious but largely unexplained condition of honeybees *Apis mellifera*, known as colony collapse disorder (CCD). Biologists have speculated that CCD is caused by interactive effects between two or more factors, any of which would be individually insufficient to cause the disorder. One possibility is that sub-lethal concentrations of a pesticide or other harmful substance could be making bees more susceptible to a familiar pathogen. Synergistic effects of this kind affect various insects and have been employed in integrated pest control, thereby minimising pesticide usage.

Dr Pettis and his colleagues investigated the possibility, previously suggested (Cummins, 2007), that a synergistic effect might be harming honey bees. They exposed honeybees to various combinations of a neonicotinoid, imidacloprid, and a microsporidian parasite, *Nosema*. They then measured not only the rate of mortality (as compared with the natural rate in a healthy bee colony) but also a range of sub-lethal effects, including energy demand and certain physiological indicators of immunity.

Addition of imidacloprid led to increased mortality even at the lowest concentration tested (0.7 mg/kg); slightly more than the dose required to induce sub-lethal behavioural effects (Medrzycki *et al.*, 2003). Mortality was additively increased when *Nosema* was administered simultaneously. There was a further synergistic effect on parasite-induced mortality when the concentration of imidacloprid was increased to 70 mg/kg. The two factors also induced a high energy demand, as measured by sucrose consumption. Bees infected with *Nosema* use more energy owing to behavioural alterations, but imidacloprid induced an additional demand.

The study did not show any significant effect on two markers of immunity in individual bees; total haemocyte (blood cell) count or the activity of the enzyme phenoloxidase. There was, however, a significant decrease in the activity of another enzyme, glucose oxidase. This enzyme confers social immunity by production of hydrogen peroxide, which acts as a natural antiseptic in the food of the workers and larvae. The decrease in glucose oxidase activity occurred only when imidacloprid and *Nosema* were present together and could help to explain the enhancement of mortality in bees simultaneously exposed to the two agents.



Although the US study has not yet been formally published, similar results have been independently published by a group of research workers at the National Institute for Agricultural Research in Avignon, France (Alaux *et al.* 2010).

On 13th January 2011, the UK House of Commons debated an Early Day Motion (EDM 1267), tabled by Martin Caton, the Member of Parliament for the Gower, South Wales. The motion called on the Government to “act urgently to suspend all existing approvals for products containing neonicotinoids and fipronil pending more exhaustive tests and the development of international methodologies for properly assessing the long-term effects of systemic pesticides on invertebrate populations”. Mr Caton was concerned that the government had not adequately responded to a report that Buglife had submitted on the subject (Kindemba, 2009). Fifty-seven MPs signed the motion.

Matt Shardlow, Chief Executive of Buglife, reported that there had been a good debate. He reported also a change of stance by the British Bee Keeping Association (BBKA), which is now urging an urgent review, rather than maintaining a position that there was no effect and no cause for concern. He does not expect a ban to be imposed at this stage, but thinks that the recent parliamentary debate could be eventually seen as a turning point in Buglife’s campaign.

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Solar panels as insect traps: mitigation of harm

The use of renewable energy sources is clearly a very ‘good thing’ but it can result in harm to invertebrates or their habitats. Examples include the flooding of valleys for hydro-electric schemes or the unintentional



trapping of insects on surfaces of installations such as wind turbines and solar panels. The results of recent research on the attraction of insects to solar panels have been summarised in the European Commission's Environment News Alert Service (Science for Environment Policy), Issue No 227.

The research concerned types of insect (mainly aquatic ones) that are attracted to the light reflected from solar panels because it has similar properties to the reflection from water, particularly in its high degree of polarisation (i.e. the alignment of a proportion of the light waves in the same direction). Although insects do not necessarily die as a direct result of landing on the surface, they can become highly exposed to predation and they sometimes lay eggs on the panels, thus losing reproductive potential.

The behaviour of mayflies, caddis flies, dolichopodid flies and tabanid flies in the vicinity of photovoltaic panels was observed. In order to find whether the panels could be made less attractive to these insects, the numbers of individuals landing on panels of different designs were compared.

The greatest potential for trapping was found in vertical solar cells and on black plastic sheeting, which cause more polarisation of reflected light even than water. It was found, however, that the attractiveness of a black shiny surface was greatly reduced by dividing it into a grid. The number of insect landings was reduced by a factor of 16.7, 26.5 and 10.3 for mayflies, caddisflies and dolichopodids respectively.

Using the principle of dividing reflective surfaces into a grid, the research group found that the solar panels could be rendered far less attractive to insects, especially by surrounding them with white frames or dividing them into a grid, using white tape. For example, black-framed panels attracted 6.9 times more landings by mayflies than white-framed ones.

The study also included a comparison of two types of solar panel: a plain black panel and a white-framed panel, consisting of small black cells separated by narrow white margins. There was a much higher frequency of captures or landings on the plain black panels, compared with the grid design: 6.6, 2.7 and 8.7 times greater for mayflies, dolichopodids and tabanids respectively. There was also some loss of efficiency in performance, but this was estimated to be only about 1.8 per cent.

The research workers point out that their findings do not prove that solar panels have significant effects on reproductive success and



predation of insects. They have, however, shown that a problem is likely to exist, but that it could be mitigated.

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Butterfly Conservation Europe

In September 2010, Butterfly Conservation Europe (BCE) issued its first newsletter (obtainable from: www.bc-europe.org). Chaired by Josef Settele of Germany, BCE is a partnership with the aim of halting and reversing the decline of butterflies, moths and their habitats throughout Europe. The UK partner is Butterfly Conservation, represented by Martin Warren.

The newsletter includes information about a new Red List of European butterflies, together with articles about the designation of butterfly habitats in Bulgaria and Serbia. In both countries, a number of Prime Butterfly Areas (PBAs) have been identified and have in many cases been designated for protection. In Bulgaria, 49 of a total of 50 PBAs have been designated for legal protection for inclusion in the NATURA 2000 network. In Serbia, 28 of a total of 40 PBAs have been included in the national "EMERALD" project. Also, the Serbian authorities propose to list many additional butterfly species for protection by law.

The BCE newsletter includes an article about a method for assessing effects of climate change on butterfly species-assemblages. The "Butterfly Climate Change Indicator" has been developed through co-operation between butterfly monitoring schemes in Catalunya, the Netherlands, the UK and Finland. By estimating the mean temperature of the European range of each species, the impact of climate change on species-composition can to some extent be predicted.

Those of us in the UK who are involved in encouraging a new generation of entomologists might be interested in the final item in the BCE Newsletter, regarding the Butterflies at School scheme, which has been run since 1989 by Dutch Butterfly Conservation (DBC). Under the scheme, schoolteachers can order packages of eggs, caterpillars and pupae of the Cabbage White butterfly *Pieris brassicae*, for their pupils to rear. Instructions are provided via the DBC website. The children release the adult butterflies in a school garden or city park at a butterfly release party.



The DBC article on Butterflies at School mentions that more than 3,000 packages are sent each year and that about 100,000 children take part in the scheme. Presumably, Dutch brassica growers are protecting their crops sufficiently to ensure that the flight to freedom of the adult butterflies is reproductively unsuccessful. This raises some interesting questions, which probably need not concern the children, but the choice of species should at least allay the sort of fears that have been expressed when butterflies of various kinds are released at weddings and at 'celebrity events' in the UK.

Proposed sale of publicly owned forests in England

The UK coalition government has announced its intention to sell the leasehold of up to 100% of the Forestry Commission estate in England. The intention is to "reform the ownership and management of the public forest estate to create a far greater role for civil society, businesses and individuals". Public consultation began on 27th January 2011 and was due to end on 21st April.

Currently, the land is managed by the Forestry Commission (FC) on behalf of the Secretary of State for Environment, Food and Rural Affairs. Although a sizeable proportion of the FC estate has been sold since the 1980s, it still comprises about 18% of all the forest land in England. The FC woodlands are managed for a mixture of timber production, wildlife conservation and public access and other recreation, but the relative importance of these aspects of management differs from place to place. Areas of woodland have therefore been placed in four categories: "large commercial", "small commercial", "multi-purpose", and "heritage". Many of the areas in the commercial categories do, however, retain characteristics of native ancient woodlands (e.g. relict ancient trees and a characteristic ground flora), even though they have been planted for timber production.

Many entomologists seem to have an increasingly 'green' image of the FC. It used to be severely criticised for converting semi-natural ancient woodlands into plantations of exotic conifers, thus radically altering the environment for invertebrates; very much for the worse in the case of butterflies and other species that depend on sunny conditions. Although the criticism was justified in many instances, extensive plantations of native broadleaved trees were also established, albeit sometimes with too much tidying up of habitats that had developed during previous years of 'neglect'.



The greener image has emerged by virtue of a broadening of the FC's remit, together with a diversification of woodlands that has become possible in the normal course of the thinning and final-crop harvesting of conifers. Also, glades have been created and many woodland rides have been widened in order to admit more sunlight and to encourage a greater diversity of scrub and herbaceous vegetation.

Although a change of ownership is not necessarily a bad thing for conservation, there is probably cause for concern that private owners will not want to sacrifice any of their potential yield for the sake of wildlife. In particular they would not be required to adopt the Forest Design Plans that currently operate in each FC woodland area. Each Plan is open to consultation and sets out the intended management of the woodland for wildlife and public recreation as well as for timber production. There are also benefits for wildlife under internationally recognised certification schemes, that would not be mandatory for new owners.

In addition to adopting habitat management plans for woodlands that are primarily designated for timber production, the FC seems to have an especially good record in its management of protected sites. According to figures provided by an anti-sales campaign group, 99% of Sites of Special Scientific Interest (SSSIs) managed by the FC in England are in favourable or recovering condition. This exceeds the achievement of any other significant SSSI manager in England in the public, private or charitable sectors. (The government target for the end of 2010 was 95%.) Private owners would need to comply with legislation to prevent damage to SSSIs, but they would not need to honour any additional commitments.

Another concern is that those of us who study invertebrates in English woodlands might find this more difficult under private ownership. Currently, the FC operates a permit system, which has not been without problems. This system is, however, subject to central policy and is open to negotiation with national organisations representing naturalists. The situation would probably be more complicated under the ownership of a range of different organisations and individuals.

The government has stated that existing public access will be assured, partly through new legislation and partly through existing provisions of the Countryside and Rights of Way Act. Access could, however, be restricted in various circumstances, or for one month each year regardless of circumstances. Also, it is possible that economic or



political circumstances could eventually lead a future government to revoke access. In any case, there can be no confidence that the authorities would take appropriate action against owners who might restrict access unlawfully.

The proposed sale applies only to England, but legislation proposed under the Public Bodies Bill would facilitate sales in other parts of the UK in the event of a change of policy, even though the latter seems very unlikely at present. This Bill contains specific clauses to disband the Forestry Commission in Wales to form part of a wider environment body. Also, as pointed out by the Woodland Trust, any proposed changes to the Forestry Act 1967 might affect the Scottish government's duties under UK legislation.

The UK government anticipates that areas of "heritage" woodland (scattered throughout England, but concentrated in the New Forest, Hampshire and in the Forest of Dean, Gloucestershire) would be managed by charitable organisations like the National Trust and the Woodland Trust. Such organisations would be dedicated to conservation and to public access but they would require very substantial additional resources in order to increase their woodland estate so greatly.

The Woodland Trust has expressed concern about the effects of the proposed sales on the future management of ancient woodland, which the trust describes as "a habitat of extraordinary continuity which stretches back hundreds – even thousands – of years". The trust has grave doubts about the practicability of the government's claim that these woodlands will be protected. It fears that some ancient woods could slip through the net of protection and that many others, having been planted with conifers, would not be restored in time to realise their remaining conservation potential.

The Woodland Trust's Chief Executive Sue Holden has criticised the scope of the public consultation, pointing out that specific questions are not being asked about the overall effectiveness of existing protection measures. She has welcomed the proposition that the sales will be leasehold, thus allowing some degree of control and protection of public benefit in all types of forests, but she is disappointed that ancient woods are not treated as a category for special consideration. Also she has pointed out that the government's unexpectedly bold move in proposing the sale of the entire FC estate in England would involve a huge amount of people's time, in government and in the voluntary and private sectors for years to come.



Hedgerow survey in the UK: an OPAL project

The Open Air Laboratories (OPAL) network is a lottery-funded initiative, which has been running since 2008 and is due to end in December 2012. It comprises a partnership of the Natural History Museum, the Field Studies Council, the National Biodiversity Network, the Meteorological Office, the Royal Parks and ten universities. OPAL has been providing funds to assist natural history societies (including the AES) with certain aspects of their work.

OPAL has also been organising field surveys, the latest of which was launched last September and focuses on hedgerows as examples of “very biodiverse habitats”. OPAL is gathering information for organisations involved in Hedgeline (<http://hedgeline.org.uk/>). Participants in the survey are invited to describe the structure of their local hedges, identifying plants that provide fruits or nuts for wildlife, and then identifying (to a “broad level”) the invertebrates living in the hedge. OPAL is particularly keen to learn about the quality of urban hedges for wildlife.

With the launch of the survey, OPAL Community Scientists (outreach staff) will be running public events over the coming months on topics related to hedges and associated invertebrates. The contact details of the OPAL Community Scientists can be found on the OPAL website, from which a survey guide can be downloaded (<http://www.opalexplornature.org/?q=BiodiversitySurvey>). The guide can also be requested by post from Lucy Carter, the OPAL Project Officer at the following address: UK Biodiversity, Department of Botany, The Natural History Museum, Cromwell Road, London SW7 5BD.



SITES AND SPECIES OF INTEREST

Invasive “killer” shrimp in England and Wales

An invasive predatory shrimp, *Dikerogammarus villosus*, has been found at Grafham, Water, Cambridgeshire in eastern England (on 3rd September 2010) and subsequently at Cardiff Bay and Eglwys Nunydd reservoir in Port Talbot in South Wales. This native of the steppes between the Black Sea and the Caspian Sea is believed to have invaded Western Europe via the Danube / Rhine Canal. Often known as the “killer shrimp” because of its voracious appetite for animals such as



native shrimps, young fish and insect larvae, it is highly invasive and can alter the ecology of the water bodies that it inhabits (in still or flowing freshwater and brackish water, often among hard surfaces or vegetation).

Superficially, *D. villosus* could be mistaken for a native shrimp, but the Freshwater Biological Association (FBA) has posted some helpful guidance for identification on its website. The FBA states that size and colour are useful aids to identification, but emphasises that the definitive features are the presence of projections on the urosome (the three tail segments of the body).

A fully grown *D. villosus* can reach 30 mm in length (from tip of tail to tip of head) and is thus considerably larger than native species such as *Crangonyx pseudogracilis* (10 mm) or *Gammarus* spp (20 mm). It is, however, more commonly only 10-20mm in length and can therefore overlap in size with native species. As far as colour is concerned, *D. villosus* usually has a series of dark transverse bands along the length of its back but it can be more uniform in colour. The native *Gammarus tigrinus* also has dark dorsal markings but these consist of discrete blotches, rather than coherent bands.

Conical projections on the dorsal sides of the first and second segments of the urosome (tail) of *D. villosus* provide the best means of distinguishing it from all of Britain's native freshwater or brackish water shrimps. The corresponding segments in *C. pseudogracilis* are generally smooth, but fine setae may be present. In the native *Gammarus* species, all three segments of the urosome have dorsal setae or spines, but no conical projections. The FBA website (www.fba.org.uk) includes illustrations of these features. Similar information can be found in the website of the GB Non-native Species Secretariat: www.nonnativespecies.org. A key to all the British species can be found in: Gledhill *et al.* (1993). *British Freshwater Crustacea Malacostraca*. Freshwater Biological Association.

In England, the Environment Agency has assumed a co-ordinating role, working closely with Natural England and Anglian Water to try to combat the threat posed by *D. villosus*. Its counterpart in Wales is fulfilling a similar role. Also, a Science and Technical Advisory Group (STAG) has been formed and is in contact with groups elsewhere in Europe.

Biosecurity is essential to reduce the risk of spreading this species in the wild, which could constitute an offence under UK legislation concerning non-native species. The users of Grafham Water are co-operating in order to comply with biosecurity measures, the effectiveness of which is being assessed in a study commissioned by STAG. In Wales, the advice is that anyone who uses waters where the



shrimp has been found must take steps to prevent it from spreading. These include simple but essential measures such as checking equipment when leaving the water and cleaning and drying it thoroughly after use. Further advice for water users in Cardiff Bay can be found at www.cardiffharbour.com.

Anyone finding the shrimp in any 'new' location in the UK is requested to send a photo and details of the location to: alert_nonnative@ceh.ac.uk.

Proposed nuclear power plants in England

Articles in *ICN* 59 and *ICN* 60 mentioned concern about the proposed development of a third nuclear power station at Dungeness, a shingle foreland with an exceptional invertebrate fauna on the south-east coast of England. In 2009, many organisations, including Butterfly Conservation and Buglife – The Invertebrate Conservation Trust submitted comments in response to a government consultation on proposals involving eleven proposed nuclear sites. As many readers will have known since the end of 2009, the government decided that the proposal for development at Dungeness should not proceed to the next stage of the decision-making process, on the grounds that the predicted damage to the nature conservation sites could not be adequately mitigated.

With regard to the other ten proposed sites, Buglife has pointed out that these are all on or adjacent to Sites of Special Scientific Interest (SSSIs), although not in the same league as Dungeness in respect of damage to habitats. Buglife has, however, drawn special attention to two of these sites, where direct damage to the invertebrate conservation interest could be avoided, provided that construction activities are sited away from the most sensitive localities. At Bradwell, Essex, the proposed site boundary impinges on a Special Area of Conservation and there is a need to protect localities where rare saltmarsh and other coastal species are present. According to Buglife, the site boundary at Sizewell (Suffolk) entirely covers one of the six remaining Bedstraw hawkmoth (*Hyles gallii*) populations in England, but is not protected by SSSI designation.

Juniper restoration at Porton Down, southern England

Porton is known both for the Defence Science and Technology Laboratory (Dstl), and for the UK's largest area of chalk downland (almost 7,000 acres or 2,800 ha) undisturbed by modern agriculture. It



also supports an estimated 20% of the UK population of juniper *Juniperus communis*. Many invertebrate species are associated with juniper in the UK, including macro-moths such as the Chestnut-coloured carpet *Thera cognata* and the Juniper carpet *T. juniperata*. The micro-moths include *Dichomeris marginella*, the rare *D. juniperella* and *Argyresthia praecocella* (the Juniper berry miner moth). Nineteen of these invertebrates are host-specific to juniper, of which 17 have been recorded at Porton.

In the 1970s, Dr Lena Ward found that the juniper population at Porton consists of two age groups; one that is now about 100 years-old, pre-dating the growth in the rabbit population, and another that became established about 50 years ago when rabbits became fairly scarce during the early outbreaks of myxomatosis. Since then, rabbits and voles have prevented regeneration. Dr Ward, who has also carried out much research on the invertebrate fauna of juniper, has found that very few junipers live much beyond 100 years. There is therefore concern not only that the older junipers are dying, but also that the younger generation could have disappeared within another 50 years, with the loss also of associated invertebrates, fungi and other species. Juniper scrub has long been declining throughout southern England and has led to the presumed national extinction of the shield bug *Pitedia juniperina*.

The Dstl is now working with Plantlife in order to establish new juniper bushes from cuttings and seedlings that can be established in shelters in suitable parts of Porton Down, or planted out when they are large enough to survive browsing by the rabbits. The project leader is Carl Mayers at Dstl. Some of the techniques are under trial by Plantlife, which is working also at a further 26 sites across England, with funding from Natural England's Countdown 2010 initiative and Biffaward.



FUTURE UK EVENTS

'World Biodiversity in Crisis', free lectures: 4, 11 and 18 March, 18.30 to 20.30 in Lecture Theatre B01, Clore Management Centre, Birkbeck College, University of London, Torrington Square, London WC1E 7HX. Enquiries: JeremyWright@walkern.org.uk or tel. 020 7485 7903.

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